FACULTY OF PURE AND APPLIED MATHEMATICS
SUBJECT CARD

Name in Polish: **Analiza Funcjonalna i jej zastosowania**
Name in English: **Applied Functional_analysis**
Main field of study (if applicable): APPLIED MATHEMATICS
Specialization (if applicable): Mathematics for Industry and Commerce
Level and form of studies: ~~1st/~~ 2nd* level, full-time / ~~part-time~~*
Kind of subject: ~~obligatory~~ / optional / ~~university-wide~~*
Subject code MAT0001573
Group of courses YES / ~~NO~~*

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	150				
Form of crediting	Egamination				
For group of courses mark (X) final course	X				
Number of ECTS points	5				
including number of ECTS points for practical (P) classes	2		2		
including number of ECTS points for direct teacher-student contact (BK) classes	1,5		1,5		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student knows and can apply basic concepts of mathematical analysis
2. Student knows and can apply basic concepts of linear algebra

SUBJECT OBJECTIVES

C1 Study of the classical concepts of topology, elements of optimization and functional analysis and its application to solve simple inverse problems

*delete as applicable

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 knows the most important theorems and hypothesis of functional analysis, topology

PEK_W02 knows basic methods of optimisation

relating to skills:

PEK_U01 knows and can apply methods of functional analysis

relating to social competences:

PEK_K01 can, without assistance, search for necessary information in the literature, also in foreign languages

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec1	Introduction to functional analysis – real world problems modeled by operator equations	4
Lec 2	Elements of topology and linear spaces	2
Lec 3	Linear normed spaces	2
Lec 4	Hilbert spaces	2
Lec 5	Linear operators	4
Lec 6	Elements of spectra theory	4
Lec 7	Fundaments of optimisation	4
Lec 8	Role of functional analysis in solving inverse problems	4
Lec 9	Elements of functional analysis in numerical methods	4
	Total hours	**30**

Form of classes - laboratory		**Number of hours**
Lab1	Solving of problems illustrating theory given in the lectures using mathematical packages for numerical computing	30
	Total hours	**30**

TEACHING TOOLS USED

N1. Lecture – traditional method
N2. Computer laboratory
N3. Consultations
N4. Student's self work – preparation for the laboratory

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W01 PEK_W02 PEK_K01	examination
F2	PEK_U01 PEK-K01	oral presentations, tests, projects, raports
P=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] E. Zeidler, Applied Functional Analysis, Springer-Verlag 1995

[2] Ch.W. Groetsch, Inverse Problems in the Mathematical Science, Vieweg-Verlag 1993

PRIMARY LITERATURE:

[1] L. Debnath, P. Mikusiński, Introduction to Hilbert Spaces with Applictions, Academic Press 2005

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Prof. dr hab. Wojciech Okrasiński (Wojciech.Okrasinski@pwr.edu.pl)

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT **FUNCTIONAL ANALYSIS, TOPOLOGY AND OPTIMIZATION MAT001573** AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **APPLIED MATHEMATICS** AND SPECIALIZATION **MATHEMATICS FOR INDUSTRY AND COMMERCE**

Subject educational effect	**Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)****	**Subject objectives*****	**Programme content*****	**Teaching tool number*****
PEK_W01 (knowledge)	K2MST_W03 K2MST_mic_W01	C1	Lec 1-Lec 9	1, 3
PEK_W02	K2MST_W07 K2MST_mic_W02 K2MST_mic_W03	C1	Lec 1- Lec 9	1, 3
PEK_U01 (skills)	K2MST_U24 K2MST_U25 K2MST_mic_U01 K2MST_mic_U02 K2MST_mic_U03	C1	Lab 1	2, 3, 4

PEK_K01 **(competences)**	K2MST_K06 K2MST_mic_K01 K2MST_mic_K02	C1	Lec 1- Lec 9, Lab 1	1, 2, 3, 4

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above